Involved in a great number of space projects in orbit and beyond for over 20 years, Axon’ Cable has a wealth of experience in designing and manufacturing interconnect solutions able to withstand the stresses of launch and the harsh environment of space. The company is particularly strong in the area of high data rate interconnect, and has provided high-speed links on-board telecommunications, military, scientific and earth observation satellites including Alphabus, ISS, Astro H, Bepi Colombo, Maven, Sentinel and Solar Orbiter.

APPLICATIONS
High speed data links offered by Axon’ Cable are designed to be used in spacecraft for different applications including:

- SATCHEL AND LAUNCHER Cabling
- CONNECTION BETWEEN THE MAST OF THE LAUNCHER AND THE CONTROL SYSTEM
- SPACECRAFT COMMUNICATION NETWORKS
- DRIVER TECHNOLOGY COMPATIBILITY: LVDS (LOW VOLTAGE DIFFERENTIAL SIGNALING)
- HIGH DATA RATE PHOTODIODES
- INTERCONNECTION OF HIGH DEFINITION IMAGERY SENSORS IN SATELLITES
- SYNTHEIC APERTURE RADAR AND HYPER-SPECTRAL OPTICAL INSTRUMENTS
- DRIVER TECHNOLOGY COMPATIBILITY: CM, CURRENT MODE LOGIC

Which Axon’ solutions for which data rate?

<table>
<thead>
<tr>
<th>PROTOCOL</th>
<th>DATA RATE (BASE BAND)</th>
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<tr>
<td>SPACEWIRE</td>
<td>UP TO 1MB/S</td>
</tr>
<tr>
<td>SPACEWIRE</td>
<td>9 WAY MICRO-D STANDARD CABLE (ESCC903 004 VARIANTS ORDER CODE LOW MASS SPACEWIRE) FOR HIGHER ELECTRICAL PERFORMANCES (XILINK) / MICRO-MACH®-BASED LINK</td>
</tr>
<tr>
<td>SPACEFIBRE, WIZARDLINK</td>
<td>MICRO-MACH®-BASED LINK</td>
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<tr>
<td>TT-ETHERNET (ETHERSPACE)</td>
<td>MICRO-MACH®-BASED LINK</td>
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<td>XAUI</td>
<td>SPACEFIBRE &amp; AXOMACH®</td>
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<td>RS 422/ RS 485 / CAN</td>
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<tr>
<td>AXOMACH®, HIGH DATA RATE LINKS FOR FASTER DATA TRANSMISSION</td>
<td></td>
</tr>
<tr>
<td>ULTRA LOW MASS COAX LINK</td>
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</table>

The Ultra Low Mass Coax link based on Axon’ coaxial cable expertise is almost 30% lighter than the already very light Low Mass SpaceWire. This radical solution is significantly smaller and more flexible than the conventional twisted pair approach and exceeds the performance requirements for high-speed serial data links compared to twisted pair cables. It can be an interesting alternative for applications where installation space and mass budgets are extremely limited, or particularly where an alternative protocol to SpaceWire is used.

MIL-STD-1553

DATABASES

Axon’ Cable combines a wide range of expertise in cable and connector manufacturing. For example, the company designs and manufactures all the key components (cables, couplers and connectors) used in satellite transmission systems in compliance with the MIL-STD-1553 standard for aeronautics and space applications.

Axon’ has been supplying these databus looms to the Ariane 5 launcher since the early 90’s.

SPACEWIRE:

INTEGRITY OF LVDS SIGNALS

In addition to bus harnesses which ensure the connection between on-board devices, SpaceWire links enable data transfer rates of up to 400 Mbps. The ES/CC903/003 qualified cable and ES/CC 340/029 EPPL2 connectors and accessories manufactured by Axon’ protect the integrity of LVDS signals provided by the devices.

The 9 way micro-D connector can be used with a wide variety of cable types.

Axon’ also offers a solution to lighten traditional high-speed links: the Low Mass SpaceWire (qualified to ECSS902/004).

MICROMACH®:

HIGHER PERFORMANCE

As data rates and EMI requirements increase, the micro-D becomes more limited. Axon’ has therefore developed MicroMach®, a new, optimized SpaceWire connector. Through an ESA Technology Research Project, the MicroMach® connector is born, drawing on the twin heritages of Axon’ blisteringly fast Axomach® range and the tried and tested Micro-D with its high-visibility, Twist Pin contact system.

This new connector:

- Has very close in size to the 9 way Micro-D, so little additional footprint on equipments
- Has matched 100 ohm impedance pairs, so provides excellent continuity of signal
- Enjoys a robust EMC design, providing protection for both the cable and the equipment
- Has capable of data rates well in excess of typical SpaceWire performance – up to 3Gb/s
- The MicroMach® range includes four in-line connector variant, three PCB variants and a saver connector.

AXOMACH®, HIGH DATA RATE LINKS FOR FASTER DATA TRANSMISSION

For even higher data rates Axon’ offers Axomach®, a range of very high data rate links composed of low loss microwave coaxial cables and different connector types as well as in-line male and female variants. Axomach® connectors are available in panel mount, SMD or saver connectors and can also be terminated with SMA panel mount RF connectors. The data transmission rate on this range is up to 10 Gbps per lane. The new SpaceFibre protocol (ECSS-E-ST-50-11C) is also covered by a special condensed 2 way Axomach® SpFi variant.

ULTRA LOW MASS COAX LINK

The Ultra Low Mass Coax link based on Axon’ coaxial cable expertise is almost 30% lighter than the already very light Low Mass SpaceWire. This radical solution is significantly smaller and more flexible than the conventional twisted pair approach and exceeds the performance requirements for high-speed serial data links compared to twisted pair cables. It can be an interesting alternative for applications where installation space and mass budgets are extremely limited, or particularly where an alternative protocol to SpaceWire is used.